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## UNDERSTANDING RELATIONS

(Third Installment)

E. F. Codd

Q: In both CODASYL DBTG Reports (1969, 1971) and in the GUIDE-SHARE DBMS Requirements Report the only relationships that are explicitly discussed are those between two kinds of records or entities (for example, the relationship between a firm's employees and the skills they possess. Relationships involving three or more kinds of entities sound like a mathematical fiction with no practical value. Do relationships of degree greater than two really exist?

A: Such relations or relationships (for the time being, we shall not make any distinction) are abundant in the world at large and in the commercial world in particular. We shall cite three examples.

In the first example, we define a ternary relation (degree 3) using only one kind of entity (cities). Suppose we are running a trucking firm that operates between all the major cities of North America. One of the relations we might be interested in is the BETWEEN relation defined as follows: city B is between city A and city C if A, B, C are distinct cities and the shortest distance from A to B plus the shortest distance from B to C is no more than 25 percent greater than the shortest distance from A to C. If we were to tabulate all possible triples (A, B, C) of city names having the property that B is between A and C in the above sense, then we would have a representation of the relation BETWEEN as defined above. If, in the definition, we had chosen a percentage other than 25, we would, of course, have obtained a BETWEEN relation with a different meaning and a different tabulation from the specific relation defined above.

In the second example, we define a ternary relation FLIGHT using two kinds of entities (pilots and dates). FLIGHT is defined as a set of triples (A, B, C) where A is the captain's name, B is the copilot's name, and C is the date A and B flew together. This does not mean that we think stewardesses should always be overlooked.

In the third example, we define a ternary relation SUPPLY using three kinds of entities (suppliers, parts, and projects). SUPPLY is a set of triples (A, B, C) where A, B, C are the identification numbers of a supplier, a part and a project respectively, and supplier A supplies part B to project C.

Note for the curious reader: These three ternary relations have an interesting property in common with one another - a property related to the difficulty of decomposing them into binary relations. What is this property?

Q: Does the absence of explicit reference to relations of higher degree mean that neither DBTG nor GUIDE-SHARE (GS) provides support for relations of degree greater than two?

A: Both proposals call for some support for these higher degree relations, but they make a sharp distinction between binary relations (degree 2) and relations of higher degree. In GS, binary relations are called relationships. In DBTG binary relations are represented in asymmetric structures called sets (a rather inappropriate term). As far as higher degree relations are concerned, the closest relevant concept in DBTG '69 is the record type, and in GS the entity set. In fact, these reports propose that users see relations in not just two distinct structural representations, but at least four (directed binary relationships, repeating groups, ordering, and record types), when one representation will suffice in principle.

Q: Why do these proposals treat higher degree relations so differently from those of degree 2? And why do they propose as many as four different ways of viewing relations?

A: This is a matter for the respective committees to answer and it is to be hoped that they will eventually publish detailed technical justifications for their respective positions. What we shall try to do is merely place some relevant arguments on record. Whether and to what extent these arguments were considered by the DBTG and GS committees, only they can tell us.

Correspondence should be addressed to:

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## SIGFIDET Bibliography: Second Spasm

E.H. Sibley

The last issue of SIGFIDET's FDT initiated a bibliography, and asked for volunteers. In fact, we had not expected to continue this venture so soon, but the interest seems high so we have more in this issue. Our second offering contains (principally) the bibliography and articles from the Wharton Schools' Conference on Research on Computers in Organizations (held last October, and reported in the latest edition of DATA BASE, the newsletter of our sibling SIG, "BDP"). It also contains, as "seasoning", a few annotations supplied by our chairman, Bernie Plagman.

I should like to thank all people who called, wrote, made suggestions, and offered to help. I intend to write to each with suggestions as to their role, but presently list them so that they know they are not forgotten.

The Database MAP of ACM's New York City Chapter,  
Bruce Berra of Syracuse University,  
Luiz Conrad, Department of Supplies and Services, Ottawa,  
Barney Corwin of General Foods,  
Liz Fong, National Bureau of Standards,  
Gordon Gerson of the USAF Academy,  
Kenneth Gibb of Bell Laboratories,  
Dave Hsaio of Ohio State University,  
Gene Lowenthal of MRI,  
Fred Newpeck of the University of New Mexico,  
James Rothnie of the U.S. Army at Fort Bragg, North Carolina,  
T.V. Schroeder of Pratt and Whitney Aircraft,  
Bob Taylor of the University of Massachussetts,  
and Anthony Winkler of the USAF Academy.

There are several theses, many technical reports, and two large bibliographies (from Bell Laboratories - compiled by A. R. Pierce and from P & W, compiled by T. V. Schroeder and "backlogged" from Computing Reviews). So these people will be busy!

Jean Sammet of IBM (and ACM) tells me that she is surprised (but pleased) to see her book included, even though the publication date is wrong.

Pete Ingerman of Equitable suggests we should include references to reviews in ACM Computer Reviews where applicable: "Just as a mean is not truly significant without a standard deviation, so also I find the citation of a paper less significant without at least a reference to an evaluation thereof." I think this is a good idea, and shall try

to include these references, but from my own point of view, I find CR rather biased and terribly slow. Often I can tell who wrote the review before peeking at the end. Also many papers in our list have never been reviewed (or are too recent for the severe "lag"). Thus, I feel the CR is not exactly a norm! As another aside - CR does not ask this for their own published bibliographies: BUT IT IS STILL A GOOD IDEA.

Finally, I have a letter from Mr. Charles H. Stade as follows:

March 11, 1974

Dear Prof. Sibley:

A copy of the latest issue of the ACM's FDT containing your articles and bibliography has been sent to me with the suggestion that I make some comments. Under the circumstances I think you have made a good attempt to at least find a method of dealing with some of the problems of data base technology. Information science being in the very crude state of development that it is, you are quite correct in emphasizing the communication gap between workers and the need to identify pertinent literature as matters in need of serious attention. Although I have no easy or ready-made solutions, perhaps I can suggest some things to look for and places to look in that have so far escaped your attention.

Material such as that in the issue of FDT that I have seen will not alleviate these problems because it almost completely avoids them. There are three basic issues that you will have to identify and deal with: (1) You do not have the technical knowledge necessary for data base management, even in the form of bibliographies the contents of which you and your colleagues have not read. (2) If you, or anyone else, were to somehow acquire some of this knowledge, it could not be communicated in a publication such as FDT because the appropriate, special language or symbolic system needed as a carrier is unknown. (3) You cannot acquire such knowledge by any conventional process of education (at least not now) because all such processes presuppose the existence of a suitable language, at least on the part of the instructor. To illustrate the situation in another way-- if publishing firms did not know the difference between printing technology and literary talent they would be very screwed up; until you learn the difference between computing technology and information science you will stay very screwed up.

Much of the information that you need is available in published works. I have written a short article on these problems that has been accepted, with great praise, for publication in Computerworld, but as of this date it has not yet appeared. I have also submitted, on request, a much more detailed paper and annotated bibliography to Mr. Lee Revens at ACM headquarters in NYC. Early publication of this MS would not seem to be likely, but perhaps Mr. Revens could give you some additional information, and perhaps a copy.

Sincerely,

Charles H. Stade  
3343 W. 65 Street  
Chicago, Illinois 60629

Undoubtedly the major problem that we academics have is keeping in touch with reality. Real practitioners, who we meet but seldom, should not be daunted by our ivory tower attitude, but tell us what we lack - so please keep the comments coming. Write either to me or the editor:

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College Park, Maryland 20742

- B1 -  
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E. H. Sibley  
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THE IMPACT OF COMPUTERIZED PROGRAMS ON MANAGERS AND ORGANIZATIONS, A  
CASE STUDY OF AN INTEGRATED MANUFACTURING COMPANY  
IN THE IMPACT OF COMPUTERS ON MANAGEMENT, C.A. MYERD(ED.), MIT PRESS  
67 282-302

HUYSMANS, J.H.  
THE EFFECTIVENESS OF THE COGNITIVE-STYLE CONSTRAINT IN IMPLEMENTING  
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JENSEN, R.E. AND URETSKY, M.  
THE JOURNAL OF ACCOUNTING RESEARCH, SUPPLEMENT  
69

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SUBJECTIVE PROBABILITY, A JUDGMENT OF REPRESENTATIVENESS  
COGNITIVE PSYCHOLOGY, VOL 3  
7207 430-454

KEEP, P.G. AND MCKEENEY, J.L.  
THE EVOLUTION OF AN EXPERIMENTAL DESIGN FOR THE STUDY OF COGNITIVE STYLE  
HARVARD BUSINESS SCHOOL, WORKING PAPER 73-4  
7301

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THE USE OF ACCESS FREQUENCIES IN DATA BASE ORGANIZATION  
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THE MANAGEMENT INFORMATION SYSTEM SURVEY IN ROLLS-ROYCE--A CASE HISTORY  
OPERATIONAL RESEARCH QUARTERLY, SPECIAL CONFERENCE ISSUE  
68

KLATZKY, S.R.  
AUTOMATION, SIZE AND THE LOCUS OF DECISION MAKING, THE CASCADE EFFECT  
JOURNAL OF BUSINESS, VOL 43

70

KLING, R.  
TOWARD A PERSON-CENTERED COMPUTER TECHNOLOGY  
PROCEEDINGS, ACM NATIONAL CONFERENCE, ATLANTA, GEORGIA  
7308

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SOFTWARE UNIT PROFILES AND KIVIAT FIGURES  
PERFORMANCE EVALUATION REVIEW  
7309

RIEBE, C.  
THE EVALUATION OF MANAGEMENT INFORMATION SYSTEMS  
REPRINT NO. 532, GSIA, CARNEGIE MELLON UNIVERSITY  
71

RIEBEL, C.  
MIS TECHNOLOGY--A VIEW OF THE FUTURE  
SPRING JOINT COMPUTER CONFERENCE PROCEEDINGS, AFIPS PRESS, VOL 40  
72

RIEBEL, C.F., VANHORN, R.L. AND HEAMES, J.T. (EDS.)  
MANAGEMENT INFORMATION SYSTEMS, PROGRESS AND PERSPECTIVES  
CARNEGIE PRESS  
71

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ANGEFORS, B.  
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ECONOMIC SURVEY METHODS  
INSTITUTE FOR SOCIAL RESEARCH, UNIVERSITY OF MICHIGAN  
7201

AUDON, K.C.  
COMPUTERS AND BUREAUCRATIC REFORM, THE POLITICAL FUNCTIONS OF URBAN  
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74

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HARVARD BUSINESS SCHOOL, DIVISION OF RESEARCH  
67

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THE INTEGRATION OF DATA PROCESSING AND THE ORGANIZATION  
UNPUBLISHED PHD DISSERTATION, SLOAN SCHOOL OF MANAGEMENT, MIT  
70

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A USER ORIENTED APPROACH TO SYSTEMS DESIGN  
PROCEEDINGS OF THE 1971 ACM NATIONAL CONFERENCE  
71 325-338

LUCAS, H.C. JR  
COMPUTER BASED INFORMATION SYSTEMS IN ORGANIZATIONS  
SCIENCE RESEARCH ASSOCIATES  
73

LUCAS, H.C. JR  
SALES FORCE PERFORMANCE AND THE USE OF A SALES INFORMATION SYSTEM  
RESEARCH PAPER NO. 154, STANFORD GRADUATE SCHOOL OF BUSINESS  
7303

LUCAS, H.C. JR  
A DESCRIPTIVE MODEL OF INFORMATION SYSTEMS IN THE CONTEXT OF THE  
ORGANIZATION  
DATA BASE, VOL 5, NOS 2, 3, AND 4, WINTER  
73

LUCAS, H.C. JR  
USER REACTIONS AND THE MANAGEMENT OF INFORMATION SERVICES  
MANAGEMENT INFORMATICS  
74

LUCAS, H.C. JR  
THE PROBLEMS AND POLITICS OF CHANGE, POWER, CONFLICT, AND THE INFORMATION  
SERVICES SUBUNIT  
IN F. GRUENBERGER(ED.), EFFECTIVE VERSUS EFFICIENT COMPUTING,  
PRENTICE-HALL  
74

LUCAS, H.C. JR AND PLIMPTON, F.B.  
TECHNOLOGICAL CONSULTING IN A GRASSROOTS ACTION ORIENTED ORGANIZATION  
SLOAN MANAGEMENT REVIEW, VOL 14, NO 1, FALL  
72 17-36

MADNICK, S.E.  
THE FUTURE OF COMPUTERS  
MIT TECHNOLOGY REVIEW  
7307

MANN, F. AND WILLIAMS, L.  
OBSERVATIONS ON THE DYNAMICS OF A CHANGE TO ELECTRONIC DATA PROCESSING  
EQUIPMENT  
ADMINISTRATIVE SCIENCE QUARTERLY, VOL 5, NO 2  
6009 217-256

MARCH, J.G. AND SIMON, H.A.

ORGANIZATIONS  
WILEY  
58

MARSCHAK, J.  
ECONOMIC THEORY OF INFORMATION  
WORKING PAPER 118, WSMI, UCLA GRADUATE SCHOOL OF MANAGEMENT  
6405

MASON, R.J., MEYER, K.H. AND VANHORN, P.L.  
STUDIES IN DATA SYSTEM DEVELOPMENT, THE VANDENBERG AIR FORCE BASE PROJECT  
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54

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A PROGRAM FOR RESEARCH ON MANAGEMENT INFORMATION SYSTEMS  
MANAGEMENT SCIENCE, THEORY, VOL 19, NO 5  
7301 475-487

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COMPARISON OF ALTERNATIVES FOR THE REPRESENTATION OF DATA ITEMS VALUES  
IN AN INFORMATION SYSTEM  
PROCEEDINGS OF THE WHARTON CONFERENCE ON RESEARCH ON COMPUTERS IN  
ORGANIZATIONS, DATA BASE, VOLS 2-4, WINTER  
73

MCDERMOTT, D.V. AND SUSSMAN, G.  
THE CONNIVER REFERENCE MANUAL  
PROJECT MAC, 545 TECHNOLOGY SQUARE, CAMBRIDGE, MA 02139  
7305

MCFARLAN, W.  
PROBLEMS IN PLANNING THE INFORMATION SYSTEM  
HARVARD BUSINESS REVIEW, VOL 49, NO 2  
7103

MCFARLAN, W.  
MANAGEMENT AUDIT OF THE EDU DEPARTMENT  
HARVARD BUSINESS REVIEW, VOL 51, NO 3  
7305

MCFARLAN, W. AND NOLAN, R.L.  
CURRICULUM RECOMMENDATIONS FOR GRADUATE PROFESSIONAL PROGRAMS IN  
INFORMATION SYSTEMS, RECOMMENDED ADDENDUM ON INFORMATION SYSTEMS  
ADMINISTRATION  
COMMUNICATIONS OF THE ACM, VOL 16, NO 7  
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MCFARLAN, W., NOLAN, R.L. AND NORTON, D.P.  
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73

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68

MCLEAN, E.R.  
A COMPUTER-BASED MEDICAL HISTORY SYSTEM, FACTORS AFFECTING ITS  
ACCEPTANCE AND USE BY PHYSICIANS  
UNPUBLISHED PHD DISSERTATION, SLOAN SCHOOL OF MANAGEMENT, MIT  
59

MERTEN, A.  
PROGRAM LOGIC MANUAL OF A PROTOTYPE DATA TRANSLATOR  
DATA TRANSLATION PROJECT, DEPT OF INDUSTRIAL AND OPERATIONS ENGINEERING  
UNIVERSITY OF MICHIGAN

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INFORMATION INPUT OVERLOAD  
IN YOVITS, JACOBI AND GOLDSTEIN(EDS.), SELF-ORGANIZING SYSTEMS, SPARTAN  
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73

MOCK, T.J.  
COMPARATIVE VALUES OF ALTERNATIVE INFORMATION STRUCTURES  
JOURNAL OF ACCOUNTING RESEARCH, EMPIRICAL RESEARCH SUPPLEMENT  
69

MOCK, T.J.  
ORDERING ALTERNATIVE INFORMATION STRUCTURES  
AIS WORKING PAPER 72-2, GRADUATE SCHOOL OF MANAGEMENT, UCLA  
7107

MOCK, T.J.  
CONCEPTS OF INFORMATION VALUE AND ACCOUNTING  
THE ACCOUNTING REVIEW, VOL 36, NO 4  
7110

MOCK, T.J., ESTRIN, T.L. AND VASARHELYI, M.A.  
LEARNING PATTERNS, DECISION APPROACH, AND VALUE OF INFORMATION  
THE JOURNAL OF ACCOUNTING RESEARCH, VOL 10, NO 1, SPRING,  
72

MOCK, T.J.  
THE VALUE OF BUDGET INFORMATION  
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MOCK, T.J.  
A LONGITUDINAL STUDY OF SOME INFORMATION STRUCTURE ALTERNATIVES  
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MORAVEC, A.F.  
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MANAGEMENT DECISION SYSTEMS, COMPUTER BASED SUPPORT FOR DECISION MAKING  
DIVISION OF RESEARCH, HARVARD GRADUATE SCHOOL OF BUSINESS  
71

MUMFORD, E.  
A COMPREHENSIVE METHOD FOR HANDLING THE HUMAN PROBLEMS OF COMPUTER  
INTRODUCTION  
IFIP CONGRESS 71, NORTH HOLLAND, AMSTERDAM  
71

NELSON, H.W. AND PETERSEN, J.W.  
INTEGRATED MATERIAL MANAGEMENT  
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6110

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AN INTERACTIVE PLANNING SYSTEM  
FORTHCOMING

NESS, D. AND SPRAGUE, C.  
AN INTERACTIVE MEDIA DECISION SUPPORT SYSTEM  
SLOAN MANAGEMENT REVIEW, VOL 14, NO 1, FALL  
72 51-61

NESS, D., SPRAGUE, C. AND MOULTON, G.A.  
IN THE IMPLEMENTATION OF SOPHISTICATED INTERACTIVE SYSTEMS  
SLOAN SCHOOL OF MANAGEMENT WORKING PAPER 506-71

NEWELL, A.  
HEURISTIC PROGRAMMING, ILL-STRUCTURED PROBLEMS  
IN J. ARNOFSKY(ED.), PROGRESS IN OPERATIONS RESEARCH, VOL 3, WILEY  
69

NORTON, D.P.  
ORGANIZING FOR THE COMPUTER, TO CENTRALIZE OR TO DECENTRALIZE  
HARVARD BUSINESS REVIEW, FORTHCOMING

NOLAN, R. L.  
PLIGHT OF THE EDP MANAGER  
HARVARD BUSINESS REVIEW, VOL 51, NO 3  
7305

NOLAN, R.L.  
MANAGING THE COMPUTER RESOURCE, A STAGE HYPOTHESIS  
COMMUNICATIONS OF THE ACM, VOL 16, NO 7  
7307 399-405

NOLAN, R.L.  
THE COMPUTER DATA BASE, THE FUTURE IS NOW  
HARVARD BUSINESS REVIEW, VOL 51, NO 5  
7309

NOLAN, R.L.  
COMPUTER DATA BASES, THE FUTURE IS NOW  
HARVARD BUSINESS REVIEW  
7310

BASED ON A SURVEY OF TEN INSTALLATIONS, THIS ARTICLE DISCUSSES THE  
PROS AND CONS OF THREE ALTERNATIVE APPROACHES TO A DATA BASE  
ENVIRONMENT. CONTAINS GOOD EXAMPLES AND RECOMMENDS A SPECIFIC COURSE OF  
ACTION. WRITTEN TO BE UNDERSTOOD BY NON-TECHNICAL. REFERENCES.

NOLAN, R.L.  
PRELIMINARY IDEAS OF RESEARCH DESIGN TO INVESTIGATE INTERNAL PRICING  
OF COMPUTER RESOURCES FOR MANAGEMENT CONTROL  
PROCEEDINGS OF THE WHARTON CONFERENCE ON RESEARCH ON COMPUTERS IN  
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73

NOLAN, R.L.  
TRANSFER PRICING, EDP AS A PROFIT CENTER  
HARVARD BUSINESS REVIEW, FORTHCOMING

NUNAMAKER, J.F. JR  
A METHODOLOGY FOR THE DESIGN AND OPTIMIZATION OF INFORMATION PROCESSING  
SYSTEMS  
PROCEEDINGS OF THE SPRING JOINT COMPUTER CONFERENCE, VOL 38, AFIPS PRESS  
7105

NUNAMAKER, J.F. JR AND KONSZYNSKI, B.  
DATA QUALITY AND VALIDATION ASPECTS OF A LARGE SCALE SOCIO-ECONOMIC  
OPTIMIZATION PROBLEM  
PROCEEDINGS OF THE SIXTH HAWAII INTERNATIONAL CONFERENCE ON SYSTEMS  
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A NON-PROCEDURAL HIGH-LEVEL LANGUAGE FOR AUTOMATED DESIGN OF APPLICATION  
SYSTEMS  
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7309

NUNAMAKER, J.F. JR, NYLIN, W.C. AND KONSZYNSKI, B.  
PROCESSING SYSTEMS OPTIMIZATION THROUGH AUTOMATIC DESIGN AND  
REORGANIZATION OF PROGRAM MODULES  
PROCEEDINGS OF THE FOURTH INTERNATIONAL CONFERENCE ON COMPUTER AND  
INFORMATION SCIENCES, ACADEMIC PRESS

NUNAMAKER, J.F. JR AND SCHUTTE, L.J.

A SURVEY OF DECISION TABLES AS A PROBLEM STATEMENT TECHNIQUE  
WORKING PAPER, DEPARTMENT OF COMPUTER SCIENCES, PURDUE UNIVERSITY

OLDFATHER, D., GINSBERG, A.S., MARKOWITZ, H.M. AND LOVE, P.L.  
PROGRAMMING BY QUESTIONNAIRE, THE JOB SHOP SIMULATION PROGRAM GENERATOR  
RAND PUBLICATION, RM-5162-PR  
67

OLDFATHER, D., GINSBERG, A.S., MARKOWITZ, H.M. AND LOVE, P.L.  
PROGRAMMING BY QUESTIONNAIRE, AUXILIARY PROGRAMS  
RAND PUBLICATION, RM-5869-PR  
6808

OLDFATHER, D., GINSBERG, A.S. AND MARKOWITZ, H.M.  
PROGRAMMING BY QUESTIONNAIRE  
RAND PUBLICATION, RM-4463-PR  
6504

OLDFATHER, D., GINSBERG, A.S. AND MARKOWITZ, H.M.  
PROGRAMMING BY QUESTIONNAIRE, HOW TO CONSTRUCT A PROGRAM GENERATOR  
RAND PUBLICATION, RM-5129-PR  
6611

ORDEN, A.  
DATA BASE APPLICATIONS AT INLAND STEEL  
PROCEEDINGS OF THE WHARTON CONFERENCE ON RESEARCH ON COMPUTERS IN  
ORGANIZATIONS, DATA BASE, VOLS 2-4, WINTER  
73

PETTIGREW, T.  
THE MEASUREMENT AND CORRELATES OF CATEGORY WIDTH AS A COGNITIVE VARIABLE  
JOURNAL OF PERSONALITY, VOL 26  
5912 532-544  
PHILLIPS, D.C.  
SYSTEMS THEORY--A DISCREDITED PHILOSOPHY  
ABACUS, SEPT 1969, REPRINTED IN P. SCHODERBERG (ED.) MANAGEMENT SYSTEMS,  
SECOND EDITION, WILEY  
71

PLAGMAN, B.K. AND ALTSHULER, G.  
AN INTEGRATED CORPORATE DATA BASE CONCEPT AND ITS APPLICATION  
DATA DESCRIPTION, ACCESS AND CONTROL (1972 ACM SIGFIDET WORKSHOP)  
7211 395-419  
INTRODUCES THE ICDB CONCEPT AND ILLUSTRATES HOW IT WAS APPLIED AT THE  
FEDERAL RESERVE BANK OF NEW YORK. CONTAINS A CONCRETE EXAMPLE OF AN  
INFORMATION SYSTEM STRUCTURE AND SHOWS HOW THE ICDB CONCEPT WAS  
DESIGNED TO SUPPORT THE STRUCTURE. REFERENCES.

PLAGMAN, B.K. AND ALTSHULER, G.  
A DATA DICTIONARY/DIRECTORY WITHIN THE CONTEXT OF AN ICDB  
PROCEEDINGS FJCC 1972  
72  
DISCUSSES IN DEPTH THE OBJECTIVES AND REQUIREMENTS OF THE DD/SS.  
ILLUSTRATES THE RELATIONSHIP OF THE DD/SS TO THE OVERALL ICDB CONCEPT  
AND EXPLORES SOME SPECIFIC DESIGN ALTERNATIVES WHILE RECOMMENDING A  
COURSE OF ACTION.

- POLLACK, S...  
CONVERSION OF LIMITED ENTRY DECISION TABLES TO COMPUTER PROGRAMS  
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STUDIES IN DATA SYSTEM DEVELOPMENT, THE AIR RESERVE RECORDS CENTER  
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64
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THE USE OF SIMULATION AS A PEDAGOGICAL DEVICE  
MANAGEMENT SCIENCE, VOL 12, NO 12  
6608
- POUNDS, W.F.  
THE PROCESS OF PROBLEM FINDING  
INDUSTRIAL MANAGEMENT REVIEW, VOL II, NO 1, FALL  
69
- POWERS, R.F.  
AN EMPIRICAL INVESTIGATION OF SELECTED HYPOTHESES RELATED TO THE SUCCESS  
OF MANAGEMENT INFORMATION SYSTEMS PROJECTS  
UNPUBLISHED DOCTORAL DISSERTATION, UNIVERSITY OF MINNESOTA, 1971  
REPRINTED IN MCFARLAN, NOLAN, AND NORTON  
73
- POWERS, R.F. AND DICKSON, G.W.  
MIS PROJECT MANAGEMENT, MYTHS, OPINIONS, AND REALITY  
CALIFORNIA MANAGEMENT REVIEW, SPRING  
73
- RADNER, M., RUBENSTEIN, A.H. AND TANSIK, D.A.  
IMPLEMENTATION IN OR AND R AND D IN GOVERNMENT AND BUSINESS ORGANIZATION  
OPERATIONS RESEARCH  
7011 967-991
- RAUNER, R.M.  
LABORATORY EVALUATION OF SUPPLY AND PROCUREMENT POLICIES  
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5807
- RAUNER, R.M. AND STEGER, W.A.  
SIMULATION OF ICBM SUPPORT  
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EXPERIENCE WITH A MANAGEMENT INFORMATION AND CONTROL LABORATORY  
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70

SACKMAN, H.  
EXPERIMENTAL ANALYSIS OF HUMAN BEHAVIOR IN TIME-SHARING AND BATCH  
PROCESSING INFORMATION SYSTEMS  
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71

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ON-LINE PLANNING  
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72

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67

SCHULMAN, E.L. AND WEINBERG, G.M.  
TRAINING PROGRAMMERS FOR DIVERSE GOALS  
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73

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PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON EXTENSIBLE LANGUAGE  
ACM  
72

SHARPE, W.F.  
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SHAUL, D.  
WHAT'S REALLY AHEAD FOR MIDDLE MANAGEMENT  
PERSONNEL  
6411

SHLICHTA, P.  
OVERLAP IN HIERARCHICAL STRUCTURES  
IN WHYTE, WILSON, AND WILSON (EDS.), HIERARCHICAL STRUCTURES,  
AMERICAN ELSEVIER PUBLISHING CO  
69

SHYCON AND LAFFEI  
SIMULATION, NEW TOOL FOR DISTRIBUTION  
HARVARD BUSINESS REVIEW, VOL 39, NO 6  
6111

SIMON, H.A.  
THE NEW SCIENCE OF MANAGEMENT DECISION  
HARPER, ALSO IN THE SHAPE OF AUTOMATION, HARPER 1965  
61

SIMON, H.A.  
THE IMPACT OF NEW INFORMATION PROCESSING TECHNOLOGY ON MANAGERS  
COMMERCIAL LETTER (REPRINTED IN SCHODERBEK, MANAGEMENT SYSTEMS, SECOND  
EDITION, WILEY 1971)  
6610

SIMON, H.A.  
THE SCIENCES OF THE ARTIFICIAL  
MIT PRESS  
69

SLOVIC, P.  
UNPUBLISHED RESEARCH  
OREGON RESEARCH INSTITUTE  
73

SLOVIC, P., FLEISSNER D. AND BAUMAN, S.  
ANALYZING THE USE OF INFORMATION IN INVESTMENT DECISION MAKING, A  
METHODOLOGICAL PROPOSAL  
JOURNAL OF BUSINESS, VOL 45  
7204 283-301

SLOVIC, P. AND MACPHILLAMY, D.  
DIMENSIONAL COMMENSURABILITY AND CUE UTILIZATION IN COMPARATIVE JUDGEMENT  
OREGON RESEARCH INSTITUTE RESEARCH BULLETIN, VOL 11, NO 4  
72

SMIDT, S.  
FLEXIBLE PRICING OF COMPUTER SERVICES  
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6806 9591-9600

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DIVERSE APPROACHES TO TEACHING PROGRAMMING--THREE REPORTS  
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UNPROGRAMMED DECISION MAKING  
INDUSTRIAL MANAGEMENT REVIEW, VOL 9, NO 2  
67 18-30

SPRAGUE, C.  
AN UNEXPECTED TREND IN MANAGEMENT DECISION SYSTEMS  
FORTHCOMING  
SPRAGUE, C.R., LIEBMAN, L. AND SPRAGUE, L.  
MANAGEMENT DECISION SUPPORT SYSTEMS, TURN AVAILABLE DATA INTO  
ACCESSIBLE INFORMATION  
MANAGEMENT DEPARTMENT WORKING PAPER 124, UNIVERSITY OF PENNSYLVANIA  
7112  
SPRAGUE, C.R.

SOFTWARE DESIGN FOR AN OPERATING MANAGEMENT DECISION SYSTEM BASED ON  
LINEAR PROGRAMMING  
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71

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BARRIERS TO PROGRESS IN INFORMATION SYSTEM DESIGN, TECHNOLOGICAL OR NOT  
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73

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WHOLESALE/RETAIL SPECIALIZATION IN RESOURCE SHARING NETWORKS  
COMPUTER, VOL 6, NO 8  
7308

STEIG, D.B.  
FILE MANAGEMENT SYSTEMS REVISITED  
DATAMATION, VOL 18, NO 13  
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STEVENS, S.S.  
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MANAGING TO MANAGE THE COMPUTER  
HARVARD BUSINESS REVIEW, VOL 44, NO 5  
6609 98-110

TEICHRDEW, J.  
A SURVEY OF LANGUAGES FOR STATING REQUIREMENTS FOR COMPUTER-BASED  
INFORMATION SYSTEMS  
FALL JOINT COMPUTER CONFERENCE, VOL 41, PART 2  
72

THEIL, H.  
ECONOMICS AND INFORMATION THEORY  
RAND McNALLY AND CO  
69

THEIL, L.H. AND HEAPS, H.S.  
PROGRAM DESIGN FOR RETROSPECTIVE SEARCHES ON LARGE DATA BASES  
INFORMATION STORAGE AND RETRIEVAL, VOL 8, NO 1  
7202 1-20

TVERSKY, A. AND KAHNEMAN, D.  
AVAILABILITY, A HEURISTIC FOR JUDGING FREQUENCY AND PROBABILITY  
COGNITIVE PSYCHOLOGY, VOL 5  
7309 207-232

US BUREAU OF LABOR STATISTICS  
ADJUSTMENTS TO THE INSTALLATION OF OFFICE AUTOMATION  
BULLETIN NO 1275, DEPARTMENT OF LABOR  
5005

VANHORN, R.L.  
VALIDATION OF SIMULATION RESULTS  
MANAGEMENT SCIENCE, THEORY, VOL 17, NO 5  
7101 247-253

VANHORN, R.L.  
EMPIRICAL STUDIES OF MANAGEMENT INFORMATION SYSTEMS  
PROCEEDINGS OF THE WHARTON CONFERENCE ON RESEARCH ON COMPUTERS IN  
ORGANIZATIONS, DATA BASE, VOLS 2-4, WINTER  
73

VAUGHAN, J.A., PARAT, A.M. AND HAAS, J.A.  
FDIC STUDY OF THE IMPACT OF COMPUTERS AND EDP ON MANAGERIAL AND  
ORGANIZATIONAL BEHAVIOR IN SMALL TO MEDIUM SIZED BANKS  
UNIVERSITY OF PITTSBURGH PRESS  
58

WEBER, E.C.  
CHANGES IN MANAGERIAL MANPOWER WITH MECHANIZATION OF DATA PROCESSING  
JOURNAL OF BUSINESS, VOL 32  
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WEINBERG, G.M.  
PL/I PROGRAMMING--A MANUAL OF STYLE  
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70

WEINBERG, G.M.  
THE PSYCHOLOGY OF COMPUTER PROGRAMMING  
VAN NOSTRAND REINHOLD CO  
71

WEINBERG, G.M. AND SCHULMAN, E.L.  
GOALS AND PERFORMANCE IN COMPUTER PROGRAMMING  
HUMAN FACTORS  
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WHISLER, T.L.  
THE IMPACT OF COMPUTERS ON MANAGEMENT  
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70

WILDOUGHBY, T.  
NEEDS, INTERESTS, REINFORCER PATTERNS AND SATISFACTION OF DATA PROCESSING  
PERSONNEL  
UNPUBLISHED DOCTORAL THESIS, UNIVERSITY OF MINNESOTA  
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WINDGRAD, T.  
UNDERSTANDING NATURAL LANGUAGE  
ACADEMIC PRESS  
73

WOODWARD, J.D.  
DATA BASE AND MIS  
IN MANAGEMENT INFORMATION SYSTEMS, IAG OCCASIONAL PUBLICATION, NO 4  
AUERBACH  
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WOOLSEY, R.E.  
A CANDLE TO SAINT JUDE OR FOUR REAL WORLD APPLICATIONS OF INTEGER  
PROGRAMMING  
INTERFACES, VOL 2, NO 2  
7202 20-29

YASUKAWA, Y.F., MARCUS, R. AND WEINBERG, G.M.  
STRUCTURED PROGRAMMING IN PL/C--AN ABECEDARIAN  
WILEY  
73

ZANNETOS, Z.S. AND SERTEL, M.R.  
COMPUTERTIZED MANAGEMENT INFORMATION SYSTEMS AND ORGANIZATIONAL STRUCTURES  
S. DAN SCHOD. OF MANAGEMENT WORKING PAPER 485-70  
7009

# D A T A B A S E M A P

*An Open Letter From Its Founding Chairwoman*

Dear Databasophiles,

As the 1973-74 year comes to an end Database MAP, a new group sponsored by both NYC/ACM and ACM SIGFIDET, deems it worthwhile to restate its purpose for its more than 120 members, and to sketch summarily its aims, accomplishments and plans.

The prime motivation behind the creation of Database MAP is to provide a forum where data processing professionals of all levels of applicable specialization, proficiency and interest can find exposure to the concepts and practices associated with Database Management Systems (DBMS) and benefit from the exchange of ideas and experiences.

To that end, the group's working committee (currently 43 members large) has divided its activities into two categories. The objective of the first is to organize tutorials and seminars, primarily intended for its members, but also, open to other interested individuals. Toward this objective the following has been accomplished:

- An Introductory Tutorial to bring everybody on board on Database Technology.
- A Short Course on the Codasyl Database Task Group Report to present the essentials of this key document, since its philosophy, specifications and recommendations are found in many major database management systems and have strongly influenced the design of others.
- A Seminar on the Univac DMS1100 to illustrate an implementation (or near implementation) of the Codasyl concept.
- A Seminar on the IBM IMS/VS to illustrate a somewhat different view of the database management system problem.

There are also some firm plans for seminars featuring widely used packages, to be offered by commercial software houses, and presentations providing specific case histories in the usage of these systems, to be given by private industrial firms.

The objective of the second type of activity is to organize small workshops for the purpose of elucidating some of the questions raised by the new way of doing data processing business, and for extending and enhancing the state-of-the-arts in certain areas. Toward that objective the following subcommittees have been created:

- A Subcommittee on Characteristics and Comparative Evaluations of DBMS's (chaired by Eugene Chiang of the National Broadcasting Corp.). It will serve to help enterprises evaluate the features available to the DBMS's they are associated with, either

## Database MAP

actually or potentially, and estimate the value of contemplated modifications.

- A Subcommittee on Data Administration (chaired by Harry Melzer of the Federal Reserve Bank) to define and clarify this new function, and analyze its impact on the enterprise's organization.
- A Subcommittee on Data Dictionaries/Directories (chaired by Burton Ross of S.D. Leidesdorf, Inc.) to identify and study the advantages of this tool for the management of Data, with or without a DBMS.
- A Subcommittee on Database Bibliography (chaired by Etelle Grinoch of the Sperry Division, Sperry Rand Corp.) to further Dr. Sibley's work in that area, and to develop a computerized database oriented system, which will eventually be servicing a community of users.
- A Subcommittee on Database Installation Case Histories (chaired by Irwin Balaban from the Sperry Systems Management, Sperry Rand Corp.) to gain insight into the realities of engineering the transition between an Applications oriented and a Database oriented computer facility.
- A Subcommittee on Economic Analysis of Database Centered Installations (chaired by Eric Knutsen from Erick Knutsen Associates, Inc.) to obtain quantified (primarily) evaluations of the net advantages of operating the data processing function around the Database concept.

All six subcommittees are currently active and progressing toward the stated goals. A subcommittee coordinator, Prof. Jay-Louise Weldon, from N.Y. Univ. School of Business, has been nominated to control possible overlaps in subcommittees contacts with vendors and users firms, and a treasurer, Jim Dorin, from R. Dixon Speas Associates, has been selected to handle financial matters.

Plans for the future include publication of all final reports coming out of the various groups. These will, in all likelihood, appear in the SIGFIDET Newsletter or some other ACM publication. Another plan, of great importance in this writer's view, is to attract more professionals in our creative and thriving subcommittees. In other words, please join! Database MAP is only five months old but already holds a promise for real accomplishments.

Sincerely yours,



Etelle Grinoch, Chairwoman  
Database MAP

P.S. For information on Database MAP membership, please contact E. Grinoch at Sperry Division, Great Neck, N.Y. 11020 or phone (516) 574-1075.

EXTERNAL LIAISON REPORT

End User Facilities Task Group of the CODASYL Systems Committee

The CODASYL Systems Committee, at its May 22-24, 1973, meeting decided to establish an End User Facility Task Group (EUFTG); this decision was later ratified by the CODASYL Executive Committee.

The Tasking Statement given to this group is:

- (1) To define and describe, including functional capabilities required, one or more classes of end-users of a complex-structured data base.
- (2) To analyze relationships between complexity of language, users' view of the data base, and other factors influencing total capabilities of systems satisfying the above class(es) of users.
- (3) To describe a set of functions with a reasonable degree of data independence which may be invoked by end users.
- (4) To develop the syntactic and semantic framework for one or more prototype languages for the above.

Anyone desiring additional information should contact Henry E. Lifkowitz  
at:

Honeywell Information Systems  
200 Smith Street  
MS 425  
Waltham, Massachusetts 02154

Henry's telephone number is (617) 890-8400, Extension 42342.

## CALL FOR PAPERS

### Workshop on Computer Architecture for Non-numeric Processing

14-15 October 1974, Dallas, Texas

With the increasing size and complexity of non-numeric and partially numeric data bases, it is appropriate to consider the computer architecture designed for access and manipulation of such data bases. Architecturally the interesting concepts include

- associative processors and memories
- information networks
- data base computers
- machine designs based on non-conventional structural concepts.

From the information handling side, the important questions involve

- organization of the data base to facilitate access and manipulation
- distributed data bases
- systems for processing information rather than data
- the relationship between the information system that the user sees, and the one that the system programmer/computer architect sees.

The workshop is concerned with obtaining non-numeric results from basically non-numeric data, including for example textual and image processing. While some numeric processing may be involved, it should be minor and not one of the major manipulation techniques.

This two-day workshop is designed to focus on current developments in this area, and to bring together computer architects and information handling specialists for frank discussion of problems and progress. The workshop is sponsored by SIGIR, SIGARCH and SIGFIDET, with co-sponsorship by the IEEE Technical Committee on Computer Architecture pending.

If you have an active interest in this subject, you are invited to submit the title and abstract for a paper to be presented at the workshop by 1 August 1974 to either Dr. Robert Fike or Dr. Robert Korfhage at

Department of Computer Science and Operations Research  
Southern Methodist University  
Dallas, Texas 75275

Workshop sessions will be held at the Ramada Inn-Central, located on North Central Expressway. We will be in one of Dallas' newest motor hotels, five minutes from downtown, and adjacent to S.M.U. and major restaurants. The Ramada has complimentary pick-up and delivery service to Surtran (D/FW airport limousine) and Amtrak terminals, free parking, and excellent food and beverage service. Our workshop falls during the peak of the autumn season in Dallas, so there will be plenty to do, and the Indian summer weather will be beautiful. You will enjoy yourself.

A NEW JOURNAL - Information Systems

The information sciences are broad interdisciplinary subjects which cannot be covered adequately by a single journal. *Information Systems*, due to be published in Summer 1974, is concerned with the theory and practice of designing, maintaining and using computer-based information systems. It will maintain a dual focus, including both systems operations and design and systems applications. Whereas *Information Storage and Retrieval* concentrates on those aspects of information systems emphasizing the transfer of information through libraries and information centers, *Information Systems* concentrates on generalized data base management systems, their design, interfaces and applications.

The journal will be published quarterly by Pergamon Press; the editor-in-chief is Dr. H. J. Schneider. Submissions can be mailed to him or to any of the regional editors listed below.

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(Editor-in-Chief)

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